Supplementary

Supplementary Figures
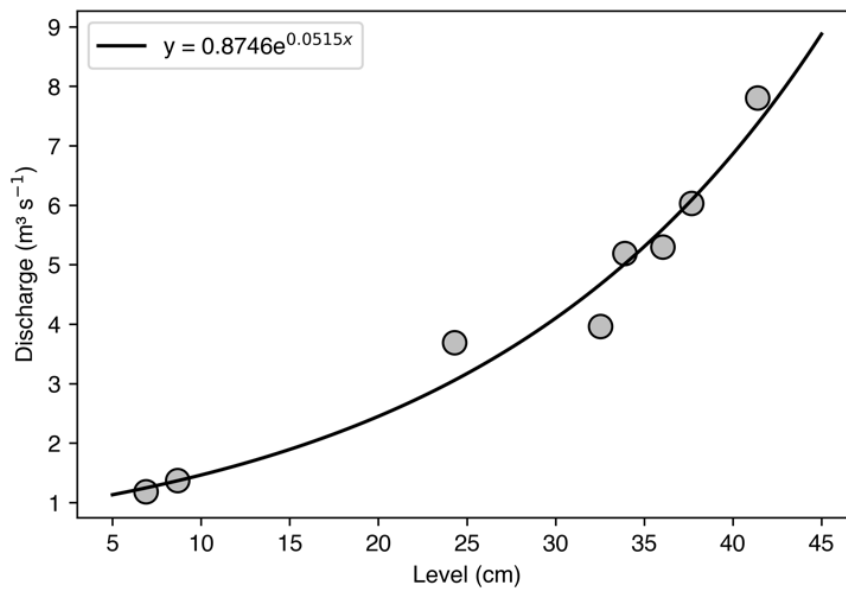
Figure S.1. *Calibration of hourly stage measurements (cm) with discharge (m³ s⁻¹) using 8 discharge measurements throughout the summer, R^2 = 0.97.*

Figure S.2. ***(a)*** *The bubble trap used to make ebullition measurments, and **(b)** bubbles resulting from ebullition trapped beneath a thin layer of ice formed on the surface of the GW2 pool during a period with below-freezing temperatures at the end of the summer.*
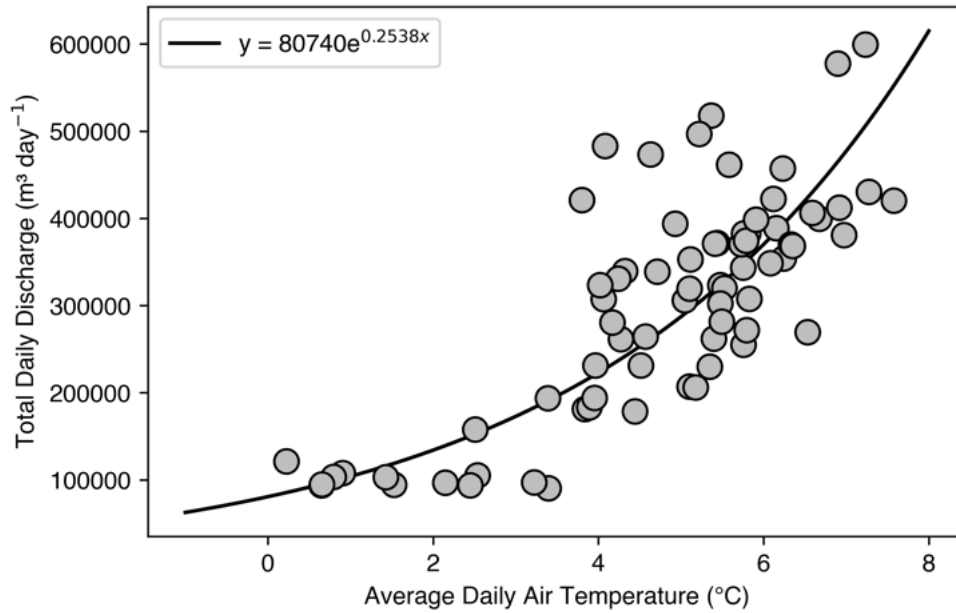
Figure S.3. *Relationship between total daily discharge from the Vallåkrabreen melt river and the average daily air temperature measured at Sveagruva (seklima.met.no), R^2 = 0.59.*

Sediment chamber measurements

The diffusive flux of methane from sediments within the proglacial forefield was measured using a chamber box in six locations throughout the glacier floodplain. A small electrical fan was fixed inside the box to maintain airflow within the chamber. Samples of the air within the box were taken four times for each deployment, starting immediately after placing the chamber down and finishing after 45 minutes. Air samples of 5 mL were injected into pre-evacuated 3 mL Exetainer vials. Methane concentration measurements of the chamber air samples were made at the University of Tromsø with a gas chromatograph fitted with a flame ionization detector (GC-FID; ThermoScientific, Waltham, MA USA).
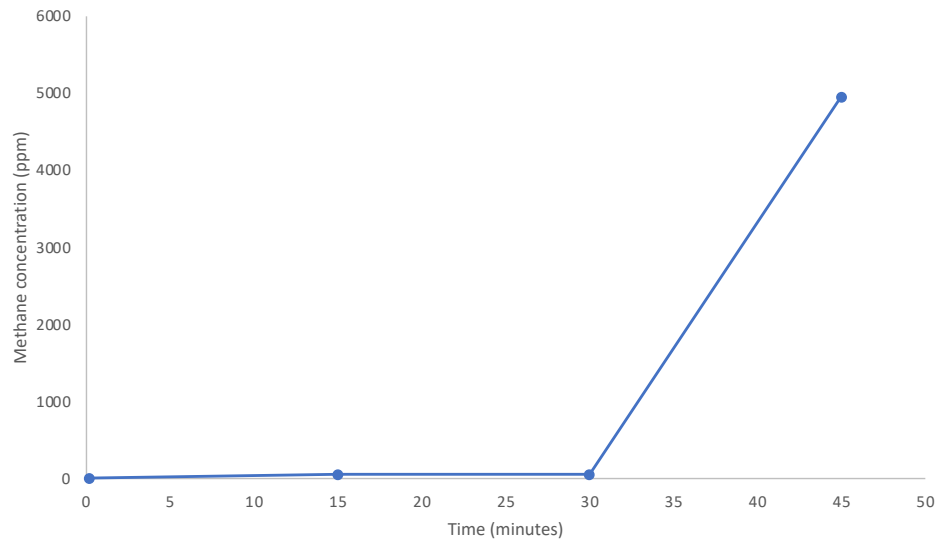
Figure S.4. Sediment chamber measurement taken on 07 September 2021. The chamber was placed on a dry vent within a groundwater pool that had drained previously. .